SHRI C. RAMACHANDRAIAH: I did not say that you had gone to discuss with Bush administration. It is pertaining to your senior Minister...(*Interruptions*)...

DR. ALLADI P. RAJKUMAR: As the Minister of State for External Affairs, he should have the information with him...(*Interruptions*)...It is unfair...(*Interruptions*)...

SHRI C. RAMACHANDRAIAH: Sir, it is a very important question and the entire nation wants to know about it.

DR. ALLADI P. RAJKUMAR: Yes. The Members would like to know about it...(*Interruptions*)...Hon. Prime Minister is sitting here. He should reply...(*Interruptions*)...

MR. CHAIRMAN: If the hon. Minister would like to reply, he can reply...(*Interruptions*)...Please take your seat. Now, Question No. 62.

अंटार्कटिका के लिए अनुसंधान दल

*62. **प्रो॰ रामबख्श सिंह वर्मा:**
श्री प्यारे लाल खंडेलवाल:†

क्या विज्ञान और प्रौद्योगिकी मंत्री यह बताने की कृपा करेंगे कि:

(क) क्या यह सच है कि सरकार द्वारा अंटार्कटिका पर शोध कार्य हेतु भारतीय वैज्ञानिकों का एक दल भेजा जा रहा है;

(ख) यदि हां, तो तत्संबंधी ब्यौरा क्या है;

(ग) भारतीय वैज्ञानिकों द्वारा अंटार्कटिका में किस विषय पर शोध कार्य किया जाएगा; और

(घ) यह कार्य कब तक पूरा हो जाएगा?

विज्ञान और प्रौद्योगिकी मंत्रालय के राज्य मंत्री (श्री कपिल सिब्बल): (क) और (ख) जी हां, । भारत सरकार 1981 से प्रति वर्ष अंटार्कटिक में वैज्ञानिक अभियान दल भेज रहा है। अब तक ऐसे 24 अभियान सफलतापूर्वक भेजे जा चुके हैं। प्रत्येक वर्ष ये अभियान किराए के जलयान में दिसंबर/जनवरी माह में भेजे जाते हैं। अभियान दल के दो घटक हैं, अर्थात् ग्रीष्मकालीन और शीतकालीन। ग्रीष्मकालीन दल वैज्ञानिक कार्यकलाप करेगा और शीतकालीन दल को वहां छोड़कर अगले वर्ष मार्च महीने में लौट आएगा। तथापि, शीतकालीन दल विभिन्न वैज्ञानिक प्रयोग करने के लिए भारतीय अंटार्कटिक केन्द्र "मैत्री" में रहेगा और वापस मुख्य भूमि में तभी

†सभा में यह प्रश्न श्री प्यारे लाल खंडेलवाल द्वारा पूछा गया।

आएगा जब उनके स्थान पर अगला अभियान दल आ जाएगा। प्रत्येक अभियान में विभिन्न वैज्ञानिक संस्थाओं/विश्वविद्यालयों से जुड़े 42 वैज्ञानिक/तकनीकी कार्मिक और भारतीय सेना के 13 संभार कार्मिक भाग ले रहे हैं।

(ग) वैज्ञानिक अंटार्कटिका में मौसम विज्ञान एवं वायुमंडल विज्ञान, भू-विज्ञान एवं हिमनद विज्ञान, जीव विज्ञान एवं पर्यावरणीय विज्ञान, मानवजीव विज्ञान एवं चिकित्सा तथा इंजीनियरी एवं संचार में अनुसंधान कार्य कर रहे हैं। मैत्री में आठ स्थायी प्रेक्षण केन्द्र स्थापित किए गए हैं, जो मौसम, भू-चुंबकत्व, भूकंपनीयता, प्लेट संचलन, बहुत कम आवृत्ति पर प्रसारण, संचार, पर्यावरणीय मूल्यांकन और शीत अनुकूलन के संबंध में निरंतर डाटा उपलब्ध करा रहे हैं।

(घ) भारतीय अंटार्कटिक अनुसंधान कार्यक्रम जारी है।

Research team to Antarctica

†*62 PROF R.B.S. VARMA:
SHRI PYARELAL KHANDELWAL:††

Will the Minister of OCEAN DEVELOPMENT be pleased to state:

(a) whether it is a fact that a team of Indian Scientists is being sent by Government to Antarctica for research works:

(b) if so, the details thereof;

(c) the subject on which the Indian Scientists would undertake research at Antarctica; and

(d) by when the task would be completed?

THE MINISTER OF STATE OF THE MINISTRY OF SCIENCE AND TECHNOLOGY (SHRI KAPIL SIBAL): (a) and (b) Yes, Sir. A scientific expedition team to Antarctica is being sent annually since 1981 by the Government of India. So far 24 such expeditions have been successfully launched. Each year the expedition is being launched in the month of December/January in a chartered vessel. The expedition team has two components viz; summer and winter. The summer team will carry out the scientific activities and will come back in the month of March next year leaving behind the winter team. However the winter team will stay back in the Indian Antarctic Station 'Maitri' for carrying out various scientific experiments and will come back to the main land when the next expedition

†Original notice of the question was received in Hindi.
††The question was actually asked on the floor of the House by Dr. Murli Manohar Joshi.

returns after replacing them. In each expedition around 42 scientific/ technical personnel belonging to various scientific institutes/universities and 13 logistic personnel drawn from Indian Army are participating.

(c) The scientists are carrying out the research work at Antarctica in the fields Meteorology & Atmospheric Science; Earth Science & Glaciology; Biology & Environmental Sciences; Human Biology & Medicine and Engineering & Communication. Eight permanent observations have been established at Maitri, which are providing continuous data on weather, geomagnetism, seismicity, plate movement, Very Low Frequency (VLF) propagation, communication, environmental assessment and cold acclimatization.

(d) The Indian Antarctic research is an ongoing programme.

श्री प्यारे लाल खंडेलवाल: माननीय सभापति जी, मैंने जो प्रश्न पूछा है, माननीय मंत्री जी ने उसका जो उत्तर दिया है, उसमें उन्होंने कहा है कि 1981 से अभी तक पिछले करीब पच्चीस वर्षों से भारतीय वैज्ञानिकों की टीम अंटार्कटिका जाती है। यह दो दलों में जाती है। इसमें 42 वैज्ञानिक और 13 कार्मिक हैं। मैं जानना चाहता हूं कि पिछले पच्चीस वर्षों से जो वैज्ञानिक लगातार जाते रहे हैं, उन्होंने वहां पर जो भी अध्ययन किया है, चाहे मौसम विज्ञान का हो, चाहे हिमनद विज्ञान का हो, भू विज्ञान का हो, आज जो सबसे महत्वपूर्ण सवाल है वह यह है कि पर्यावरण में जो गर्मी बढ़ रही है, उसका परिणाम यह हो रहा है कि सभी जगह बर्ष के ग्लेशियर्स तेजी से पिघल रहे हैं। हमारे यहां गंगोत्री पिघल रहा है, अंटार्कटिक पिघल रहा है, उत्तर ध्रुव पिघल रहा हैं। इन पच्चीस वर्षों में इसे रोकने के लिए इन वैज्ञानिकों ने वहां अभी तक क्या किया है ताकि इस बिगड़ते हुए पर्यावरण को रोका जा सके और गंगोत्री सहित बाकी जितने हिमनद और हिमखंड पिघल रहे हैं, उसे रोकने के लिए कोई कार्रवाई की जा सके, कोई योजना बनाई जा सके? यह मेरा पहला प्रश्न है।

SHRI KAPIL SIBAL: MR. Chairman, Sir, I think, the hon. Member has asked a very important question. I wish to mention that global warming is a real issue that the world community is confronted with and one of the things that we have been doing in the Antarctica—is to measure the extent of global warming. Countries present in Antarctica—eighteen countries have permanent stations—share the data amongst themselves because till 2040 the Antarctica Treaty has been frozen.

And, Antarctica as a continent can only be used for the purposes of R&D, and for scientific purposes. Now, on global warming, I might mention that in the last 50 years we have found out that in the polar regions, that

is, the South Pole and the North Pole, the temperature has increased by 4.5 degree centigrade. That is a very serious issue. Whereas the mean increase of temperature over the last 50 years on planet earth is only 0.5 degrees, in the polar regions it has increased by 4.5 degrees. What does that mean? That means that the ice cover in the polar regions is melting and that will increase the flow of water into the oceans which will, in turn, submerge very many low-lying areas throughout the world. I think the world community is grappling with this issue. Several conferences have been held on global warming. There is also a Kyoto Protocol for the purposes of reducing carbon dioxide emissions. In fact, I might just mention that the Antarctica is a continent which absorbs the maximum carbon dioxide. In a way, the Antarctica is also a saviour of planet earth because it seeks to absorb, but it can't continue to do so because of increasing the level of emissions. It is not a problem that India can resolve on its own; it is a problem that the world community is confronted with. I think that the leaders of the world including our Prime Minister have been airing these issues within the world community and in India. I think that we, on our part, at the Indian end, should now have a legal regime to ensure that there is as much reduction of carbon dioxide as possible without sacrificing our interests for economic development.

श्री प्यारे लाल खंडेलवाल: सभापति महोदय, बढ़ती हुई गर्मी के कारण बर्फ का घनत्व घटता जा रहा है। मैं यह जानना चाहता हूं कि वैज्ञानिक पिछले वर्षों से जो शोध कर रहे हैं, क्या उन्होंने इस बात का पता लगाया है कि यह घनत्व कितना घटा है? दूसरी बात मैं यह जानना चाहता हूं कि हम इस पर प्रतिवर्ष कितना खर्च करते हैं? तीसरी बात मैं यह जानना चाहता हूं कि इस वैज्ञानिक खोज के बाद वहां की वनस्पति की स्थिति क्या है, वहां पर मानव जीवन की स्थिति, प्राणी जीवन की स्थिति क्या है और इससे हम लोगों को, हमारे देश को या दुनिया को क्या फायदा होने की संभावना है?

SHRI KAPIL SIBAL: Sir, yes, we have been measuring the extent of the recession of the ice in Antarctica on a yearly basis. We have been doing this since 1981. I have personally gone there from February 2-5 of this year. I myself have seen the measurements being conducted. I have seen, actually, the ice receding, and as it has receded. So, we are giving these measurements and are supplying the date to the Government of India and we are also sharing it with the world community. As to what impact it has on vegetation, I can only tell the hon. Member that the only two kinds of vegetation that survive in the Antarctica are Lichens and

Mosses. There is no other form of vegetation in the Antarctica. It cannot survive. In fact, no life can survive in the Antarctica. So, we are yet, in fact, to grapple with the issue as to how Lichens and Mosses can survive in those cold regions, because temperatures go up to 67, 70 and -80 degrees. So, I can't possibly tell the hon. Member as to what impact it has on vegetation, because there is no vegetation in the Antaractica.

श्री प्यारे लाल खंडेलवाल: सभापति महोदय, मैंने पूछा था कि प्रतिवर्ष कितना खर्चा होता है?

श्री सभापति: खर्चा छोड़िए, खर्चे में क्या रखा है।

DR. K. KASTURIRANGAN: Mr. Chairman, Sir, through you, I would like to seek this clarification from the hon. Minister regarding our own satellite observations, which clearly bring out contrary to what the expectations are on the global warming, that there is an increased ice-shift in the recent years that has been observed in the Antarctica. The point that I would like to make is, is there a good synergy between using these kinds of unique observations—which are not what is globally accepted in the context of global warming, but, nevertheless, measurements do show this—and, how well are these synergised with respect to the multi-institutional global change programme that we have in this country?

SHRI KAPIL SIBAL: Mr. Chairman, Sir, I don't wish to enter into a debate on this issue. If you look at the history of planet earth, you will find that we have gone through several stages of warming and Ice-age. We are at the threshold of a new Ice-age. What is global warming doing? It is delaying the new Ice-Age to come. Therefore, there are contradictory observations. Some say that new Ice-age is coming, some say that global warming is taking place and destroying planet Earth. Therefore, I don't want to enter into that debate. These are very eminent scientists. I am just a layman who does not understand too much science. So, I can't get into an intellectual debate with the Hon'ble Member. But, yes, there are contradictions and there are very many viewpoints; some say that there is no global warming, but leaders of the world acknowledge the fact and we see it ourselves that temperatures, all over the globe, have gone up and scientists have so discovered it. So, there is not much that I can tell him about what we are doing in the context of these contradictions. ...*(Interruptions)*...

SHRI V. NARAYANASAMY: Sir, the hon. Minister has said that the Department of Ocean Development. ...*(Interruptions)*...

MR. CHAIRMAN: He is prepared to go there. ...*(Interruptions)*...

AN HON. MEMBER: Along with Ahluwaliaji.

MR. CHAIRMAN: So many others can also go. ...*(Interruptions)*...

SHRI KAPIL SIBAL: Sir, if I may say, as long as we can grant permanent citizenship to Ahluwaliaji, we are prepared to send him. ...*(Interruptions)*...

MR. CHAIRMAN: I am happy to see it that you know the capacity of Ahluwaliaji....*(Interruptions)*...

SHRI BALAVANT *ALIAS* BAL APTE: They are saying all these things because he is not here. ...*(Interruptions)*...

SHRI V. NARAYANASAMY: Sir, the Department of Ocean Development in their expedition has got two ships. The hon. Minister has mentioned about the research work which they are doing in Glaciology. Our Defence Forces are working in that difficult terrain in Himalayan region, and they have been defending our borders there. I would like to know whether your Ministry is exchanging the information especially about the research work with the Defence Ministry and the Defence officials for the purpose of protecting our front from the environment in that area. Sir, the ocean development is a very vast area. The hon. Minister is taking keen interest. Minerals are in plenty in the ocean. We should bring out the result out of the research work which we are doing because we are concerned with the result. It should not stop with the research only. I would like to know, for that, what the Ministry is doing?

SHRI KAPIL SIBAL: Sir, two very important questions have been put by the hon. Member. One is what is the synergy between the Ministry of Defence and us? Sir, I might inform him that we exchange information with the Ministry of Defence regularly. Let me just give only one small example. One of the things that we are trying to do in the Antarctica is to find out what are the genes that can survive in very low temperatures. And can we produce bacteria which can also survive in those temperatures? If we can produce bacteria that can survive in those temperatures, then we can use that bacteria for biodegradation even in the Himalayas because, that will have a positive environmental positive impact in the Himalayas, if we are able to provide that technology. This is

one of the things; just an example. I can tell him many more. That is on the first issue.

Sir, the second thing which the hon. Member asked is about mineral resources. Well as you know, till 2040, we cannot extract any resource. Under the Antarctica Treaty, as it exists today. We are one of the 28 observer countries. And we will renegotiate this in 2040. But we are at the moment, trying to map the mineral resources in that area, Sir, there is an interesting aspect which hon. Members might not know. I would like to inform the House that we believe, when originally Antarctica, Africa, Australia and Asia were all together, it was known as Gondwana land. Now, they are separated. In the North-Eastern tip of the Antarctic coast, what we are trying to discover is the rock morphology similar to the rock morphology in the Eastern *ghats*. So, that kind of information will ultimately allow us to make a legal claim on that part of the Antarctica, and we are moving ahead in that direction. There is a lot of iron ore; there is a lot of chromium; there is lot of silver; there is gold; there is copper; and there are lots of other minerals that are also available including gas, petroleum and methane. So, all that is something that has to be mapped and, at the moment, as I talk, we are mapping the Wohlthat Mountains which is never being done by anybody ever in the history of this world and we are, at the moment, mapping those mountains.

MR.CHAIRMAN : Would you like to lead a delegation of this House to that place?

SHRI KAPIL SIBAL : I would love to do that , sir.(*Interruptions*)

AN. HON. MENBER: Entire House, including the Chairman.

SHRI KAPIL SIBAL: Of course ; of course.

DR. ALLADI P. RAJKUMAR: Sir, though the hon. Minister has given a detailed reply, yet my conscious prods me to raise a question . What is the selection criterion for the team of scientists going to the Antarctica for research work? Which are the scientific fields represented by the team? And, who select them? Part ' b' of my question is : Can the hon. Minister apprise the House about the outcome of the various research studies that have been carried out in the Antarctica ; how much has been put in use in the Indian context?

SHRI KAPIL SIBAL : Sir, the actual selection of the scientists is done at the departmental level by an institution in Goa, which deals with the

expeditions to the Antarctica. So far as scientific fields are concerned , it depends on the kind and quality of research and the level of research that we are doing in the Antarctica. If it is seismology, we will send the seismologists; if it is glaciology, we will send a glaciology expert; if it is rock morphology, we will send somebody who is dealing with that. All that is done with great clarity and with thoroughness.So, the hon. Member need not worry about that. As far as the results of our expeditions and the results of our scientific research ara concerned, they are available. I would request the hon. Member to come to me on any aspect and I shall provide him with data, which he, ultimately, say, "I don't want to read ".

PROF. SAIF-UD-DIN SOZ: Mr. Chairman, Sir, connected with the global warming is the real question of reduction of emissions. I would like to take up with the hon. Minister, who is quite knowledgeable, that India is a leader country, so far as reduction of emissions is concerned, we are not just a signatory to the Kyoto Protocol, we produced that treaty, China, India and G-77 came together. The Protocol has been held up by the US, which is the largest producer of emissions. Therefore, as a leader country, should not India take it up with America, politely but very firmly, that the US should sign this protocol so that the mankind is saved from the disaster that is going to happen if that treaty is not fully implemented.

SHRI KAPIL SIBAL: Sir, there are two aspects of this question. One of the aspects I would like to answer, the other I would not like to answer because that does not fall within my domain. What I would like to answer is the issue of carbon dioxide emission. The hon. Member has said that we, in India, are applying technologies for reduction of those missions. I must confess that India, in the years to come, is going to be a great consumer of gasoline and energy that will result in emission of CO_2. At the moment, we are number four in the world. So, we are pretty high in the world, as it is in emissions. We have to be careful and must take a very nuance stand within the international community. We can't sacrifice our economic interests by going the whole hog, by saying that we will only have technologies. Because these technologies are exceptionally expensive, many of our medium and small-scale enterprises cannot afford them. So, there must be a balance. That is why, I don't want to answer the later part of the question because that sense of balance will be decided not by the Ministry of Science and Technology, but by other Ministries, including the Prime Minister.